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# Some results of systematical and ecological research on Agaricales, VII.

Gábor BOHUS

ABSTRACT: Experimental investigations were carried out to study the flesh disrupting on surface of fruit bodies. Further data are given to the ammonium-nitrogen utilization of Agaricus macrosporoides. Description of two new taxa: Lepista irinoides sp. n., Leucopaxillus paradoxus (COST.-DUFOUR) BOURS. f. subaerugineus f. n. Taxonomical notes on Lepista luscina (FR.) SING. var. irinoides BOH. New type specimen has been chosen for Agaricus macrosporoides BOH.

## Experimental investigation of the phenomenon of the flesh disrupting on the surface of fruit bodies

In part of the Agaricus species growing in grasslands, sunshine and dry air are considered to cause the finely, or coarsely areolate structure, and the coarsely squamulate one of pileus, in certain cases causing even radial disruption. It is especially characteristic of certain species (A. bernardii, A. maskae) that hardly any specimens with smooth pileus can be found.

The experimental investigation of this phenomenon became possible because two different strains of A. macrosporoides were available for us. In one of them (No. 14/74.), disrupting ensued easily, while in the other (No. 14/3.) it only occurred rarely.

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* Quelques résultats des recherches systématiques et oecologiques relatives aux Agaricales I-II-III-IV-V.: Bot. Közlem. 1954, 45:59-62, 231-233; 1958, 47: 273-276; 1960, 48: 232-234; 1962, 49: 246-250. Ergebnisse der auf Agaricales bezüglichen systematischen und ökologischen Forschungen VI.: Bot. Közlem., 1970, 57: 13-22.

With respect to the effect of the air moisture content in artificial light, in a thermostat: if at about 17°C temperature the nearly 100% air moisture content at times decreased to a value of about 80%, in almost all the fruit bodies of the strain No. 14/74 at least one large disruption occurred. There were such fruit bodies in which deep disruptions occurring in the young age hampered the continuation of growth. If the air moisture content was kept at 100% or a value near to that, then the results given in the table below were obtained in the 3-month observation period:

| Strains | Number of the fruit bodies | | |
|---|---|---|---|
| | non-disrupted | slightly disrupted | moderately disrupted |
| 14/74 | 24 | 15 | 3 |
| 14/3 | 78 | 1 | Ø |
| 14/4 | 8 | Ø | Ø |

According to these values, a high air moisture content caused the occurrence of the disrupting phenomenon to decrease but it did not make it stop.

The examination of insolation and the heat effect of light: the source of light in the above experiment on the air moisture content was a Sylvania (USA) strip light of 5 W F 13, which was put at a distance of 18-26 cm from the growing fungi. Its heating effect was small (1-2°C) in the thermostat. After this light source, the cultures received the dispersed light that came through the glass opening of the thermostat, for three months. In this period, 37 fruit bodies No. 14/74 were grown, and in none of them was the slightest disruption observable. By inference it can be said that under the heating effect of the direct light, there occurs a microclimatically drier air content on the surface of the fruit body, and as a consequence disruption occurs.

## Further data on the ammonium-nitrogen utilization of Agaricus macrosporoides

A satisfactory utilization of ammonium salts in fungi is an interesting question and at the same time it has importance in cultivation since ammonium compounds are more available than are sources of organic nitrogen.

Concerning the utilization, investigations were carried out earlier (BOHUS 1978) but it seemed necessary to increase the number of experiments by applying other sterilization temperature, and by a method in which the nitrogen source of also the spawn was an ammonium salt.

The result of the experiments:

| Date of inoculation | Number of replications | Strain | Number of days from inoculation | Yield* % |
|---|---|---|---|---|
| Source of nitrogen of the spawn: lucerne meal + soya meal | | | | |
| 13. XII. 1977. | 2 | 14/3-1 | 40 | 60 |
| | | | 50 | 85 |
| | | | 60 | 105 |
| | | | 70 | 117 |
| | | | 75 | 123 |
| 10. II. 1978. | 2 | 14/74-4 | 40 | 57 |
| | | | 46 | 73 |
| | | | 55 | 88 |
| | | | 60 | 100 |
| | | | 70 | 112 |
| 23. I. 1978. | 2 | 14/3-1 | 38 | 42 |
| | | | 55 | 80 |
| | | | 60 | 99 |
| | | | 66 | 110 |
| 4. II. 1978. | 2 | 14/3-1 | 37 | 40 |
| | | | 53 | 66 |
| | | | 70 | 101 |
| 31. I. 1978. | 2 | 14/3-1 | 37 | 45 |
| | | | 53 | 73 |
| | | | 64 | 90 |
| Source of nitrogen of the spawn: ammonium sulphate | | | | |
| 7. VI. 1978. | 2 | 14/3-1 | 40 | 38 |
| | | | 50 | 56 |
| | | | 55 | 76 |
| | | | 72 | 111 |
| 16. V. 1978. | 2 | 14/74-4 | 35 | 40 |
| | | | 48 | 60 |
| | | | 72 | 86 |
| | | | 82 | 111 |
| 5. V. 1978. | 2 | 14/3-1 | 45 | 53 |
| | | | 60 | 77 |
| | | | 75 | 107 |
| | | | 81 | 119 |
| 26. IV. 1978. | 2 | 14/74-4 | 35 | 28 |
| | | | 55 | 59 |
| | | | 67 | 72 |

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* **Yield %** = weight of fruit bodies related to the dry matter of the culture medium.

Average yield during a period of 75 days:

| | |
|---|---|
| if the spawn with organic nitrogen source: | 107% |
| if the spawn with inorganic nitrogen source: | 94% |
| in the latter case, it reaches the value of | 104% |

in 82 days, thus a certain delay appears.

Method: Pots: 800 ml glass vessels with Petri-dish covers and paper wadding air filters. Culture media: 80 g cob-grist per pot, 2.4 g $(NH_4)_2SO_4$, 4.8 g $CaCO_3$, 0.8 g mineral salt mixture (commercial mineral premix) swollen with 275 ml hot water, sterilized at 90-100°C for an hour. Mixed with 5% spawn (with the same composition or with organic nitrogen source). Mycelium growth at a temperature of about 25°C. Fruit bodies were produced at 16 and 20°C.

## New type specimen of Agaricus macrosporoides

A new type specimen has been chosen for A. macrosporoides, since the one published earlier (BOHUS 1974) is not in a suitable state.

Typus: 49.968 in Herbario Musei Hist.-nat. Hung., Budapest. Hortobágy: Nagyiván, Com. Szolnok, in pascuo, 11 Junii 1974, leg.: BABOS.

A figure of the new type specimen has already been published (BOHUS 1975).

## Leucopaxillus paradoxus (COST.-DUFOUR) BOURS. f. subaerugineus f. n.

This form differs from the type species in its colour: stipe upwards more or less, bluish-green or greenish blue and lamellae rarely with edge greenish blue.

The surface of pileus like deerskin. Spores 6.2-7.6 x 4.5-5.7 µm, ovoid to ellipsoid, with strongly amyloid warts-echinules.

A typo differt stipite sursum ± aerugineo, lamellisque raro cum acie subaerugineo.

Habitatio: in robinieto.

Typus: 57.456 in Herbario Musei Hist-nat. Hung., Budapest, Pótharasztpuszta, Com. Pest, in silva arenosa (Robinia, Pinus), 28. Aug. 1977, leg.: MURAI.

Further herbarial data: Inárcskakucs, Com. Pest, locust tree wood, 23 Oct. 1966, leg.: SZENES; near Debrecen, Com. Hajdu-Bihar, 2 Oct. 1967, leg.: ?

## Lepista irinoides sp. n.

For a long time we have been of the opinion that beside the species Tricholoma (Lepista) irinum, there is another similar species. Now as MOSER (1978) drew attention to this we would like to publish our observations.

The differences between the two species are chiefly as follows: Tricholoma irinum changes only slightly or shows hardly any change in colour while undergoing drying or during careful preparation without heat. While undergoing drying the other species, Lepista irinoides becomes coloured with brown; this colour may appear in older specimens on the habitat also, where rarely the colour of the gills may even darken into dirty brown. The margin of Tricholoma irinum is smooth, but that of Lepista irinoides is grooved as at Tricholoma acerbum. It is visible on Table 583 of CETTO (1976) too (s. n. Tricholoma irinum; specimen on right). The spores of Lepista irinoides are punctate or finely verrucose, what is visible without immersion also, while the spores of Tricholoma irinum show generally a similar surface structure only if stained suitably (BON. 1974; KÜHNER 1976).*

Pileus 4-14 cm latus, carnosus, e convexo vel gibboso-convexo expansus, glaber, primitus cremeus, deinde roseolocremeus, isabellinus, ochraceus, carneoloochraceus, brunneoloochraceus, brunneolus cum tinctura roseola suffusus, per exsiccationem brunnescens, cuticula separabilis; margine primitus involuto, primitus breviter (ut apud Tricholoma acerbum) et densiter costato, deinde ± distante et longiore. Lamellae 4-8 mm, confertae, emarginatae et dente decurrentes, primitus pallide ochraceae vel carneoloochraceae, deinde isabellinae, carneolobrunneolae; senectute obscurantes, brunnescentes. Stipes 4-9 cm longus, 0.8-4 cm crassus, solidus, cylindraceus, clavatus vel basi attenuatus, rariter ventricosus, albidus vel parum pileo concolor, tactu brunnescens vel ochrascens, longitudine fibrilloso vel costato subreticulatus. Caro alba, albida. Odor Iridis. Sapor dulcidulus vel quasi farinaceus. Sporae in cumulo albae vel vix cum tinctura roseola. Sporae 7-8,5 x 3,8-4,6 µm, ellipsoideae vel elongato ellipsoideae, punctato asperulae. Basidia clavata, 20-30 x 6-8 µm.

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* The opinion of KÜHNER (1976) on this question is as follows: "Sans coloration elles ( - spores de L. irina - ) semblent pratiquement lisses ou tout au plus subtilement et confusément ruguleuses, parfois un peu moins confusément dans leur partie supérieure. Dans le bleu lactique la paroi apparait indiscutablement ornée à l'immersion, car les ornements sont cyanophiles; ... En Amérique du Nord, BIGELOW et SMITH distinguent de irina var. irina, dont la sporée est incarnat crème pâle (pale pinkish buff de Ridgway) et dont l'ornamentation sporale est sensible à l'immersion, un pseudoirina BIGELOW et SMITH, dont la sporée à une couleur plus vive (pale pinkish cinnamon de Ridgway) et dont l'ornamentation sporale n'est sensible qu'en microscopie électronique. Ils distinguent en outre irina var. luteospora BIGELOW et SMITH, dont l'ornamentation sporale est sensible au microscope à lumière, comme chez var. irina, mais dont la sporée est plus colorée (près de pinkish buff de Ridgway)..."

Habitatio: in silvis frondosis fruticetisque praecipue sub Robinia, Fraxino, Alno; rariter in pratis silvaticis; in circulos seriesque, interdum in caespitibus.

Typus: 57.511 in Herbario Musei Hist.-nat. Hung., Budapest, Uzsa, Com. Veszprém, in alneto, 30 Oct. 1978, leg.: KUSTOS - BABOS - BOHUS.

Further herbarial data: Uzsa, Com. Veszprém, alderwood, 21. Oct. 1978, leg.: KUSTOS - BABOS - FRIESZ. - Mts. Budai: frondose woods, Nov. 1954, leg.: KORPONAI, 19 Oct. 1958, leg.: ?; Mts. Budai: Mt. Hársbokorhegy, Querco petraeae-Carpinetum pannonicum, 12 Oct. 1955, leg.: BOHUS - BABOS; Mts. Budai: Mt. Guggerhegy, 24. Nov. 1957, leg.: ?; Mts. Budai: Mt. Hármashatárhegy, 25 Nov. 1964, leg.: FERENCZ; Mts. Budai: Mt. Csucshegy, frondose wood, 8 Nov. 1966, leg.: BOHUS - BABOS. - Mts. Bükk: Mt. Samassahegy, Querco petraeae-Carpinetum pannonicum, 6 Oct. 1955, leg.: BOHUS - BABOS; Mts. Bükk: Mt. Hosszusom, spruce-fir wood, 8 Oct. 1955, leg.: BOHUS - BABOS. - Mts. Vértes: near Szár, locust tree wood and mixed frondose wood, 25 Oct. 1970, leg.: BABOS - GALAMBOS - Mende, Com. Pest, locust tree wood, 22 Oct. 1960, leg.: BOHUS - BABOS - KONECSNI; 22 Oct. 1966, leg.: BOHUS - BABOS. - Üllő, Com. Pest, locust tree wood, 12 Oct. 1966, leg.: BOHUS - BABOS - VÉSSEY. - Gödöllő, Com. Pest, locust tree wood, 23 Oct. 1966, leg.: TÓTH. - Gödöllő-Tölgyes, Com. Pest, locust tree wood, 7 Nov. 1966, leg.: ZOLTÁN. - Isaszeg-Szentgyörgypuszta, Com. Pest, locust tree wood, 31 Oct. 1966, leg.: BOHUS - BABOS. - Tengelic, Com. Tolna, locust tree wood, 10 Oct. 1970, leg.: BABOS.

Coloured illustrations have been published as follows:
BRESADOLA (1928) Tab. 111; CETTO (1976) Tab. 583.

## Once more Lepista luscina (FR.) SING. var. irinoides BOH.

If we can determine the light coloured Lepista luscina material (cap creme, light ochre, ochre, brownish ochre), we cannot do it without difficulties. Such a fungus is that of KÜHNER (1976): "Notre champignon alpin et subalpin est plus clair; par la couleur de son chapeau, il resemble, tantot au panaeolum figuré par BRESADOLA (Iconogr. pl. 117), tantot au nimbatus tel qu'il est représenté dans les Icones de KONRAD et MAUBLANC (pl. 273)" (but not the descriptions).

Of the light coloured Lepista luscina a variety can distinguished with a smell like the Lepista irina: var. irinoides and a variety without aromatic smell: var. "kuehneri" (named provisional).

The Lepista key of MOSER (1978) may be extended in this way:

1. Geruch aromatisch (Veilchenwurzel, Irisöl, Orangeblüten). Sporen 6,5-9/4-5 µm.

1.+ Geruch wie bei L. irina. Sporen Lepista irina bzw. irinoides 4,5-6/3,5-4,5 µm Lepista luscina var. irinoides

1. ++ Geruch anders

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7. Hut horngrau bis braungrau, 3-10 cm
Lepista luscina

7. + Hut tabakbraun, 8-24 cm
Lepista rickenii

7. ++ Hut creme, hell ocker, ocker, bräunlichocker oder bräunlich, 3-10 cm
Lepista luscina var. "kuehneri"

The last material of Lepista luscina var. irinoides was found on the occasion of VII. European Mycological Congress in locust tree wood (Hortobágy, Szálkahalom, 23 Sept. 1978) by BABOS - DEMOULIN - VASS. The description of it:

Pileus 3-8 cm; from convex to depressed in centre, margin at first incurved; moderately hygrophan; slightly ochre, ochre or brownish ochre; later may be finely innato-fibrillose. Lamellae 3-6 mm wide; adnate, sinuate and decurrent with a tooth; crowded; ochre, brownish ochre at least with a flesh-brownish reflect. Stipe 3.5-5 cm long, 0.5-0.8 cm thick; clavate or thickened downwards; curved; whitish, light ochre, brownish ochre when handled; finely floccose at the apex, with a longitudinal fibrillose structure; with a white base-felt. Flesh whitish. Smell like Iris (not strong); farinaceous and spermatic when cut. Taste slightly farinaceous. Spore powder pinkish. Spores ellipsoid to short ellipsoid, 5-5.8 x 3.6-4.5 µm, punctate verrucose.

Further herbarial data: Mts. Budai: near Páty, at edge of frondose wood, 27 Nov. 1964, leg.: SZENTESI - FRANKÓ (type material); Mts. Budai: Csillebérc, mixed wood, 12 August 1965, leg.: FERENCZ - ERDEI; Mts. Budai: near Nagykovácsi, 17 August 1965, leg.: ERDEI - FERENCZ. - Mts. Börzsöny: Mt. Borbélyhegy, locust tree wood, 1 Sept. 1969, leg.: FERENCZ. - Ócsa, Com. Pest, locust tree wood, 6 Sept. 1964, leg.: FERENCZ - VÉSSEY, 12 August 1966, leg.: VÉSSEY. - Mende, Com. Pest, locust tree wood, 16 Sept. 1966, leg.: BOHUS - BABOS - FERENCZ - VÉSSEY. - Mogyoród, Com. Pest, 29 Sept. 1972, leg.: FERENCZ - VÉSSEY.

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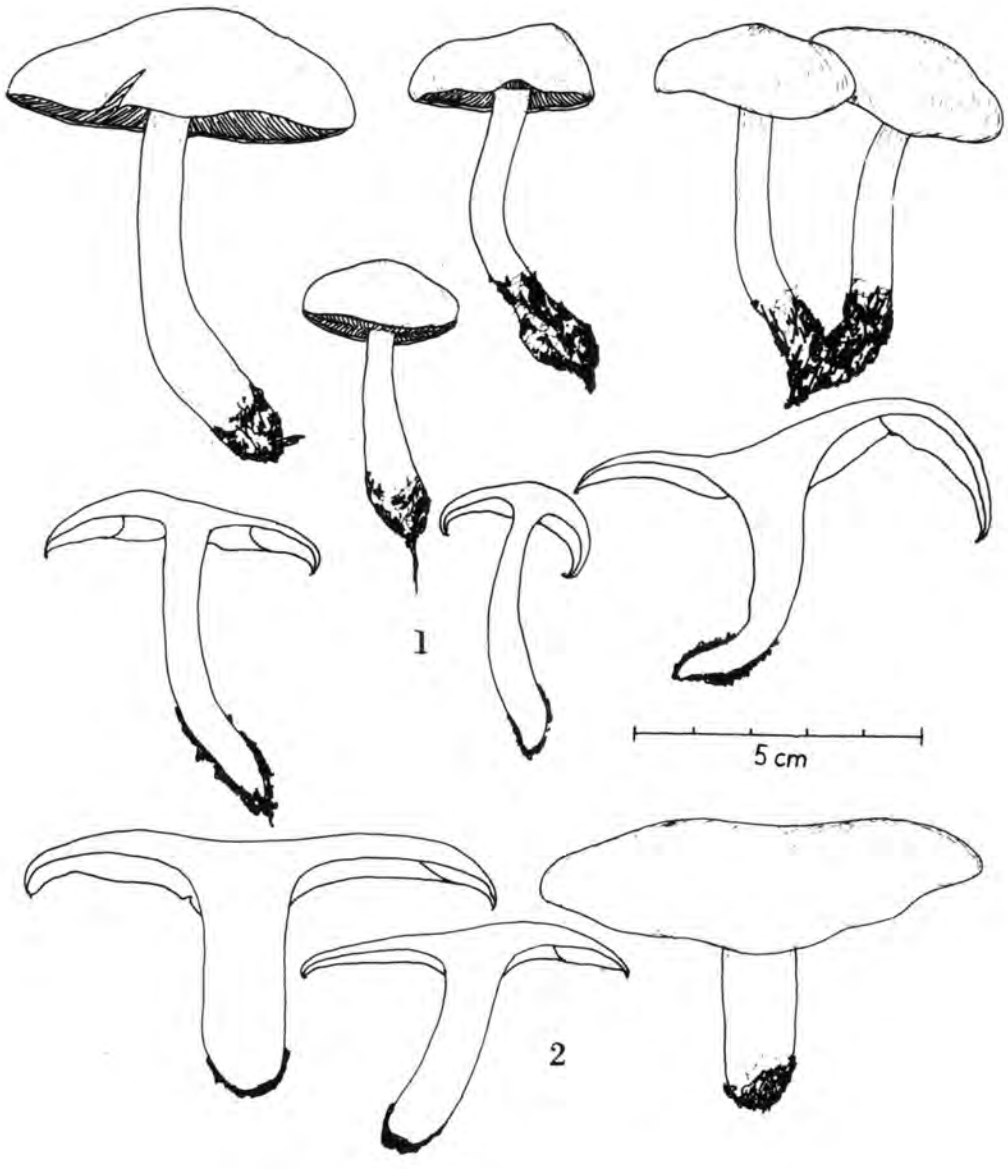
MOSER, M. (1978): Die Röhrlinge und Blätterpilze. - Stuttgart.- New York, 4. ed., pp. 532.

## EXPLANATION OF FIGURES

Lepista luscina var. irinoides - fruit bodies
Fig. 1. Hortobágy: Szálkahalom, locust tree wood, 23. September 1978.
Fig. 2. Mts. Börzsöny: Mt. Borbélyhegy, locust tree wood, 1 September 1969.

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Dr. G. BOHUS
Botanical Department
Hungarian Natural History Museum
H-1406 Budapest, Pf.: 36
HUNGARY




Lepista luscina var. irinoides